Project Introduction

Develop communications architectures and enabling technologies for mission concepts relying on multiple spatially distributed spacecraft to perform coordinated science. Characterize link and network requirements, identify technology targets, and develop analytical tools and testbed emulation to validate concepts and derive performance.

Specific examples of networked constellation missions are a radio science array formed by spatially distributed spacecraft combined with a communications network, a team of small rovers performing Mars terrain or cave exploration and dynamically connected in communications network, or a swarm of flyby spacecraft performing planetary gravity science. Multiple access, store-and-forward routing, multi-hop networking, and ranging methods supporting in situ localization will be investigated. Of key interest is implementation with small spacecraft such as Cubesats, thereby achieving cost feasibiity and potential scaling to larger networked constellations.

Anticipated Benefits

This project targets deep space exploration mission concepts whose science is enabled by means of the networked constellation architecture.

Although the primary focus of this project is to enable new forms of deep space science, the architecture and technology developed is expected to be applicable to a broader set of applications benefitting other agencies. For example, surveillance or disaster assistance may benefit from the application of networked constellation technology.

Primary U.S. Work Locations and Key Partners
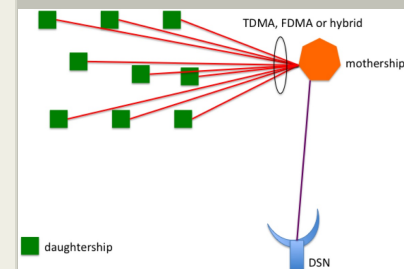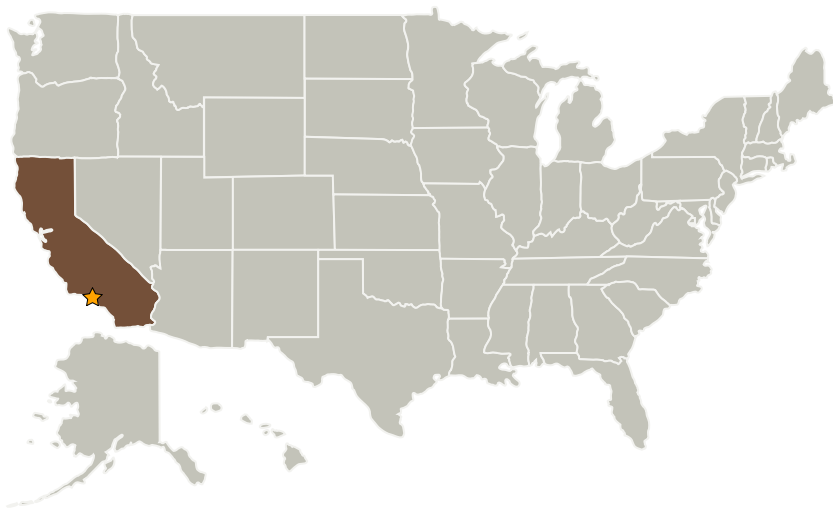
Communications Topology for Constellation Mission Concept

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

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For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/91794

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Organizations Performing Work	Role	Type	Location
⭐Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Images
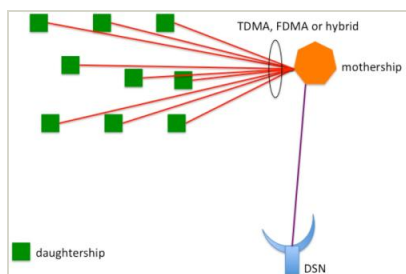
Networked Constellation Communications Technologies
Communications Topology for Constellation Mission Concept
(https://techport.nasa.gov/image/26004)

Project Management

Program Manager:
Fred Y Hadaegh

Project Manager:
Fred Y Hadaegh

Principal Investigator:
Loren P Clare

Co-Investigator:
Jay L Gao

Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **4**

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		
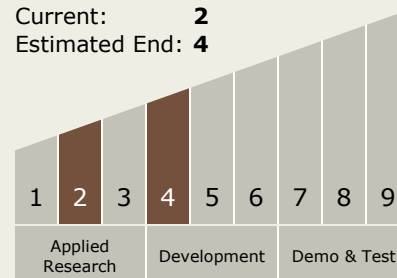
Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  └ TX05.3 Internetworking
    └ TX05.3.3 Information Assurance